

Amendment and Response

Applicant: Min Wee Low et al.

Serial No.: 10/598,390

Filed: July 9, 2008

Docket No.: 1431.173.101/FIN588PCT/US

Title: NON-LEADED SEMICONDUCTOR AND A METHOD TO ASSEMBLE THE SAME

IN THE CLAIMS

Please cancel claims 1-13 and 28-30, 33 and 34.

Please amend claims 14-19, 22-25, 31 and 32 as follows:

1.-13. (Cancelled)

14. (Currently Amended) A method to assemble a ~~leadframe strip assembly semiconductor~~ package, comprising:

providing a metal foil;

attaching a carrier tape to a first side of the metal foil; and

etching a second side of the metal foil opposite the first side to form forming a plurality of leadframes in the metal foil, each leadframe comprising a die pad laterally surrounded by a plurality of contact leads, wherein each of the leadframes is spatially isolated from neighboring leadframes, and wherein each of the contact leads and its respective die pad have a space therebetween with the contact leads and the die pad having protruding portions extending into the space.

15. (Currently Amended) The method ~~to assemble a leadframe strip assembly according to~~ of claim 14, comprising wherein forming the plurality of leadframes by an etching process includes using a surface of the carrier tape as an etch stop.

16. (Currently Amended) The method ~~to assemble a leadframe strip assembly according to~~ of claim 14, further comprising:

-attaching a passive sides of a plurality of semiconductor dies to respective ones of the die pads of the performing the etching process from one side of the metal foil forming a plurality of isolated leadframes;

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electrically connecting die contact pads on the semiconductor dies to the contact leads by wire bonds;

encapsulating the semiconductor chips, the wire bonds and the die pads in a mold material such that the space between the contact leads and respective die pads is filled with the mold material; and thereafter

removing the carrier tape to expose a planar surface formed by the mold material and bottom surfaces of the die pads and contact leads.

17. (Currently Amended) A leadframe strip assembly comprising:

a carrier tape including a metal foil attached thereon; and

a plurality of leadframes formed in the metal foil, each leadframe comprising a die pad laterally surrounded by a plurality of contact leads in the metal foil;

the die pad and the contact leads each having sidewalls, wherein the contact leads are spaced apart from the die pads such that the sidewalls of the die pad and the contact leads form a space therebetween;

the sidewalls of the die pad and the contact leads each having a protruding portion that extends into the space;

wherein the die pads, the contact leads and the protruding portions each have an upper surface that lies in a common plane.

18. (Currently Amended) The leadframe strip assembly according to claim 17, comprising wherein the die pad and contact leads of each leadframe of the metal foil are ~~spatially isolated from each other~~ have about the same thickness and lie on essentially a common lateral plane.

19. (Currently Amended) The leadframe strip assembly according to claim 17, ~~comprising spatially isolating each leadframe of the metal foil from its neighbor~~ wherein the protruding portions have a square cross section.

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20. (Previously Presented) The leadframe strip assembly according to claim 17, wherein the carrier tape comprises a polyimide film with a silicone adhesive coating and the metal foil comprises OFHC Cu.

21. (Previously Presented) The leadframe strip assembly according to claim 17, wherein the metal foil comprises a thickness of approximately 1mm to approximately 0.01mm or approximately 0.25mm to approximately 0.1mm.

22. (Currently Amended) The leadframe strip assembly according to claim 17, ~~wherein the leadframe strip assembly further comprises~~ comprising a plurality of semiconductor dies attached to respective ones of the die pads, each semiconductor die including an active surface with a plurality of die contact pads, and a passive surface, attached to the die attach pads, and electrically connected to the leadframe by a plurality of bond wires electrically connecting the die contact pads and the lead contact areas of the contact leads.

23. (Currently Amended) ~~The panel comprising a section of the leadframe strip assembly according to claim 22, comprising encapsulating wherein the plurality of semiconductor dies, the contact leads, the wire bonds and the upper surface of the carrier tape is encapsulated with a mold material.~~

24. (Currently Amended) ~~A The method to assemble a non-leaded semiconductor package of claim 16, further comprising:~~

~~—providing a panel according to claim 10;~~

~~—removing the carrier tape; and~~

singulating the non-leaded semiconductor packages by sawing through the mold material.

25. (Currently Amended) A non-leaded semiconductor package comprising:

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a leadframe comprising a die attach pad approximately in its lateral centre, laterally surrounded by a plurality of contact leads each having a contact area;

the die pad and the contact leads each having sidewalls, wherein the contact leads are spaced apart from the die pads such that the sidewalls of the die pad and the contact leads form a space therebetween;

the sidewalls of the die pad and the contact leads each having a protruding portion that extends into the space, wherein the die pads, the contact leads and the protruding portions each have an upper surface that lies in a common plane;

semiconductor die including an active surface with a plurality of die contact pads and a passive surface, wherein the passive surface is attached to the die attach pad by die attach material, and the active surface is electrically connected to the leadframe by a plurality of bond wires connecting the die contact pads and the lead contact areas of the contact leads;

the upper surface of the die, contact leads, bond wires and space between the die pad and contact leads being encapsulated with mold material; and

~~the bottom surface of the non-leaded package comprising mold material, a and the bottom~~
surface of the die attach pad and a bottom surface of the contact leads ~~on form~~ an essentially common plane.

26. (Previously Presented) The non-leaded semiconductor package according to claim 25, wherein the leadframe comprises a thickness of approximately 1mm to approximately 0.01mm.

27. (Previously Presented) The non-leaded semiconductor package according to claim 25, wherein the leadframe comprises a thickness of approximately 0.25mm to approximately 0.1mm.

28-30. (Canceled)

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31. (Currently Amended) The non-leaded semiconductor package according to ~~claim~~
29claim 25, wherein the carrier tape comprises a polyimide film with a silicone adhesive coating
and the metal foil comprises OFHC Cu.

32. (Currently Amended) The non-leaded semiconductor package according to ~~claim~~
30claim 25, wherein the metal foil comprises a thickness of approximately 1mm to
approximately 0.01mm or approximately 0.25mm to approximately 0.1mm.

33-34. (Canceled)